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EXAMINER	
TURK, NEIL N	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/815,336	LIU, JAMES Z.	
	Examiner	Art Unit	
	NEIL TURK	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 June 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,9,13-16,18,19 and 21-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,9,13-16,18,19 and 21-23* is/are rejected.

7)☒ Claim(s) *2 and 16* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *4/1/04* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Remarks

This Office Action fully acknowledges Applicant's remarks filed on June 20th, 2008. Claims 1-7, 9, 13-16, 18, 19, and 21-23 are pending. Any objection/rejection not repeated herein has been withdrawn by The Office.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the plurality of sensing components disposed within a cavity formed from a plurality of walls must be shown or the feature(s) canceled from the claim(s). Examiner notes that the drawings do not indicate a cavity. However, Examiner also notes that the drawings show a plurality of quartz crystals 108-116 within a test cell 102, as shown in figure 1. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for

consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

Claims 2 and 16 are objected to because of the following informalities: the currently amended recitation is written improperly. The recitation, “...wherein **each differing sensing film coating said each sensing component** is selected to respond to a different analyte of said plurality of analytes” should be changed to "...wherein each wherein **each differing sensing film coating *of* said each sensing component** is selected to respond to a different analyte of said plurality of analytes”.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-7, 9, 15, 16, 19, 21, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Martin et al. (5,235,235), hereafter Martin, in view of Frye et al. (5,076,094), hereafter Fry '094, and in view of Neuberger (5,065,140).

Martin discloses multiple-frequency acoustic wave devices for chemical sensing in both gas and liquid phase (abstract). Martin discloses that acoustic wave devices function as highly sensitive detectors of changes in surface mass, and specific sensors are achieved by securing a film capable of immobilizing a particular species from the environment to the interaction region of the device (lines 20-39, col. 1). Martin discloses a sensor 1 that includes two or more pairs of interdigital electrodes or transducers (IDTs) 10 having different periodicities. Martin discloses that each IDT is comprised of first and second electrodes 10a, 10b, and the IDTs are patterned on a piezoelectric substrate 12. Martin discloses that each pair of IDTs may launch and receive various Aws, including surface acoustic wave (SAW), also known as a Rayleigh wave, as well as several acoustic plate modes (APMs). Martin discloses that SAW is typically chosen for gas-phase and materials-characterization applications, while shear horizontal APM (SH-APM) is chosen for liquid-phase applications. Martin shows in figures 3 and 4 the

electronic test and measurement circuitry used to launch, receive, and monitor the propagation characteristics (lines 30-67, col. 4, figs. 1-4). Martin discloses an electronic apparatus 40 for measuring changes in AW velocity and attenuation at multiple frequencies. Martin discloses pairs of output IDTs 10 are connected into a feedback loop of an associated amplifier network 42, each functioning as a separate free-running oscillator circuit. Martin further discloses that an associated frequency counter 46, which is under the control of computer 30, detects the frequency of oscillation of each oscillator circuit (lines 6-67, col. 6, figs. 3&4). Examiner asserts that any of the frequency counters 46 communicate with the plurality of oscillators such that all the oscillators and frequency counters are connected within the same circuitry. Martin further discloses an example of a fabricated device in which the interdigital transducers were defined using an etching process from Au-on-Cr metallization (lines 15-57, col. 5). With respect to the various outputs of data recited in the claims Examiner asserts that Applicant has not established further structure to the device with respect to outputting the different modes, and thereby the prior art is capable of any such outputs as all of the structure is present in the combination.

If the disclosure to specific sensors achieved by securing a film capable of immobilizing a particular species from the environment to the interaction region of the device and the various interaction regions 13 disclosed by Martin are not taken to read as sensing regions with differing sensing films, then it would have been obvious to modify Martin as taught by Frye ‘094.

Frye '094 discloses a dual-output acoustic wave sensor for molecular identification. Frye '094 discloses that acoustic wave chemical sensors utilize a thin film coating which sorbs or binds the chemical species to be detected and when the sorption/binding is selective for the chemical species of interest, a selective chemical sensor is obtained. Frye '094 further discloses that because this selectivity is far from perfect, an array of sensors with different coatings is used (lines 33-41, col. 6).

It would have been obvious to modify Martin to include differing sensing films such as taught by Frye '094 so as to provide a more selective AW sensor.

Martin and Frye '094 do not disclose a single frequency counter that communicates with the plurality of oscillators. Martin does not disclose that each of the sensing components comprise a quartz crystal.

Neuburger discloses a gas detection system in which multiple microbalance detectors 122 comprising quartz crystal oscillators are used and the rate of change of crystal oscillation frequency is monitored by a frequency counter 130 under the control of a processor 112 (abstract, columns 2&3, fig. 1).

It would have been obvious to modify the modified Martin device to use quartz crystal as sensing devices (to which the thin film coating would be applied as taught by Frye '094) such as taught by Neuburger as quartz crystal is a known alternative sensing component for use in producing oscillation frequencies that may be measured and monitored by a frequency counter for gas-phase detection applications.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Martin in view of Frye and Neuburger as applied to claims 1-7, 9, 15, 16, 19, 21, and 23 and in further view of Desu et al. (5,527,567).

Martin in view of Frye '094 and Neuburger does not specifically disclose that the sensing components comprise electrode materials chosen from among the group comprising at least one of TiN, CoSi2, and WC.

Desu discloses high quality layered structure oxide ferroelectric thin films which are useful in the applications of piezoelectric transducers and surface acoustic wave devices (lines 33-43, col. 4). Desu discloses that a thin bottom layer electrode is deposited on top of the substrate, and may be a conductive nitride such as TiN (lines 10-27, col. 6).

It would have been obvious to modify the modified device of Martin/Frye/Neuberger to include TiN as the electrode material such as taught by Desu in order to provide a known electrode material, in the form of a conductive nitride, on the surface of a substrate for use in a surface acoustic wave device.

Claims 14 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Martin in view of Frye '094 and Neuberger as applied to claims 1-7, 9, 15, 16, 19, 21, and 23 and in further view of Ueda et al. (6,037,847), hereafter Ueda.

Martin/Frye '094/Neuberger does not specifically disclose that the sensing components comprise electrode materials chosen from among NiCr and CuAl.

Ueda discloses a surface acoustic wave device in which an interdigital electrode of an AlCu alloy is used with an Y-X cut of a $LiTaO_3$ (abstract; lines 7-17, col. 2).

It would have been obvious to modify Martin/Frye'094/Neuberger to include an AlCu alloy material for the interdigital electrode such as taught by Ueda in order to provide a known electrode material for a SAW device (for both surface and leaky surface acoustic waves).

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Martin in view of Frye '094 and Neuberger as applied to claims 1-7, 9, 15, 16, 19, 21, and 23 above and in further view of Pfeifer et al. (5,795,993), hereafter Pfeifer '993.

Martin/Frye '094/Neuberger does not specifically disclose a piezoelectric material among a group comprising at least one of: a-quartz, lithium niobate, lithium tantalite, Li2B4O7, GaPO4, langasite, ZnO, and epitaxially grown nitrides including Al, Ga, or In.

Pfeifer '993 discloses an acoustic-wave sensor. Pfeifer '993 discloses that the acoustic-wave sensor comprises an acoustic-wave device such as a SAW device, a flexural-plate-wave (FPW) device, an acoustic-plate-mode (APM) device, or a thickness-shear-mode (TSM) (also known as quartz crystal microbalance or QCM) device having a sensing region. Pfeifer '993 discloses that the sensing region includes a sensing film for sorbing a quantity of the photoresist-stripping agent, thereby altering or shifting a frequency of oscillation of an acoustic wave. Pfeifer '993 also discloses that in a preferred embodiment of the invention the acoustic-wave device is a SAW device and the sensing film comprises poly(vinylacetate), poly(N-vinylpyrrolidinone), or

poly(vinylphenol) (abstract). Pfeifer ‘993 discloses that an acoustic-wave sensor 10 comprises an acoustic-wave device 12 having a sensing region 14 including the photoresist-stripping agent sensing film 16 on the surface for sorbing (lines 35-67, col. 3, fig. 1). Pfeifer ‘993 discloses gas-phase applications utilize a SAW, while other applications utilize FPW, APM, or TSM(QCM) devices. Pfeifer ‘993 also discloses that while only a single acoustic-wave device 12 is shown in figure 1, one or more additional acoustic-wave devices may be used for the acoustic-wave sensor to detect a plurality of different agents, or to provide a reference for accurately determining the frequency shift and to compensate for environmental factors including temperature and humidity (lines 1-18, col. 4, fig. 1). Pfeifer ‘993 discloses that the SAW device has a substrate made of piezoelectric material, such as lithium niobate, crystalline quartz, lithium tantalite, or the like (lines 18-24, col. 4). Pfeifer ‘993 discloses that electrical means 20 are connected to the device for generating an acoustic wave and includes an amplifying means 26 for receiving a detected signal. Pfeifer ‘993 discloses that by locating the acoustic-wave sensor in a feedback loop of the amplifying means, a free-running oscillator is formed with the frequency of oscillation changing slightly with the amount of PSA sorbed on or desorbed from the sensing film. Pfeifer ‘993 further discloses that the frequency detection means 28 is a frequency counter, and may include a reference means (e.g. a second free-running oscillator comprising a second acoustic-wave device connected in a feedback loop of a second amplifier) (lines 20-52, col. 6, fig. 1). Pfeifer ‘993 further discloses that in another embodiment the electrical means 20 comprises amplifying means 26 connected across each of the acoustic wave and SAW devices, with each

SAW device forming a free-running oscillator (lines 43-67, col. 7). With respect to the various outputs of data recited in the claims, Examiner asserts that Applicant has not established further structure to the device with respect to outputting the different modes, and thereby the prior art is capable of any such outputs as all of the structure is present in the combination.

It would have been obvious to modify Martin/Frye '094/Neuberger to include lithium niobate, crystalline quartz, or lithium tantalate as a piezoelectric material such as taught by Pfeifer '993 in order to provide a known piezoelectric material for use in surface acoustic wave sensors.

Claims 1-7, 9, 15, 16, 18, 19, 21, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeifer et al. (5,571,944), hereafter Pfeifer '944, in view of Frye'094.

Pfeifer '944 discloses an acoustic wave based moisture sensor that includes a detector 110 and reference 120 SAW device that are used as feedback elements in oscillator circuits. Pfeifer '944 also discloses sensing film 12 and reference film 14, as well as RF amplifiers 115 and 125 connected across respective transducer pairs 114 and 124, and a frequency counter 18 connected to detect the difference frequency between the two oscillator circuits (columns 3&4+, figs. 1,6, & 7). Pfeifer '944 further discloses that in addition to a SAW device, any acoustic wave device may be used in place of the SAW device, such as shear mode resonators (quartz crystal

microbalances), acoustic plate mode devices, and flexural plate wave devices (lines 30-42, col. 7). With respect to the various outputs of data recited in the claims, Examiner asserts that Applicant has not established further structure to the device with respect to outputting the different modes, and thereby the prior art is capable of any such outputs as all of the structure is present in the combination.

Pfeifer '944 does not disclose differing sensing films on the sensing regions.

Frye '094 has been discussed above.

It would have been obvious to modify Pfeifer '944 to include differing sensing films such as taught by Frye '094 so as to provide a more selective AW sensor.

Claims 1-7, 9, 15, 16, 18, 19, 21, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeifer '993, in view of Frye '094.

Pfeifer '993 discloses an acoustic-wave sensor. Pfeifer '993 discloses that the acoustic-wave sensor comprises an acoustic-wave device such as a SAW device, a flexural-plate-wave (FPW) device, an acoustic-plate-mode (APM) device, or a thickness-shear-mode (TSM) (also known as quartz crystal microbalance or QCM) device having a sensing region. Pfeifer '993 discloses that the sensing region includes a sensing film for sorbing a quantity of the photoresist-stripping agent, thereby altering or shifting a frequency of oscillation of an acoustic wave. Pfeifer '993 also discloses that in a preferred embodiment of the invention the acoustic-wave device is a SAW device and the sensing film comprises poly(vinylacetate), poly(N-vinylpyrrolidinone), or poly(vinylphenol) (abstract). Pfeifer '993 discloses that an acoustic-wave sensor 10

comprises an acoustic-wave device 12 having a sensing region 14 including the photoresist-stripping agent sensing film 16 on the surface for sorbing (lines 35-67, col. 3, fig. 1). Pfeifer '993 discloses gas-phase applications utilize a SAW, while other applications utilize FPW, APM, or TSM(QCM) devices. Pfeifer '993 also discloses that while only a single acoustic-wave device 12 is shown in figure 1, one or more additional acoustic-wave devices may be used for the acoustic-wave sensor to detect a plurality of different agents, or to provide a reference for accurately determining the frequency shift and to compensate for environmental factors including temperature and humidity (lines 1-18, col. 4, fig. 1). Pfeifer '993 discloses that the SAW device has a substrate made of piezoelectric material, such as lithium niobate, crystalline quartz, lithium tantalite, or the like (lines 18-24, col. 4). Pfeifer '993 discloses that electrical means 20 are connected to the device for generating an acoustic wave and includes an amplifying means 26 for receiving a detected signal. Pfeifer '993 discloses that by locating the acoustic-wave sensor in a feedback loop of the amplifying means, a free-running oscillator is formed with the frequency of oscillation changing slightly with the amount of PSA sorbed on or desorbed from the sensing film. Pfeifer '993 further discloses that the frequency detection means 28 is a frequency counter, and may include a reference means (e.g. a second free-running oscillator comprising a second acoustic-wave device connected in a feedback loop of a second amplifier) (lines 20-52, col. 6, fig. 1). Pfeifer '993 further discloses that in another embodiment the electrical means 20 comprises amplifying means 26 connected across each of the acoustic wave and SAW devices, with each SAW device forming a free-running oscillator (lines 43-67, col. 7). With respect to the

various outputs of data recited in the claims, Examiner asserts that Applicant has not established further structure to the device with respect to outputting the different modes, and thereby the prior art is capable of any such outputs as all of the structure is present in the combination.

Pfeifer '993 discloses multiple acoustic-wave devices used for the acoustic-wave sensor as well as multiple sensing films, but does not specifically disclose differing sensing films on the sensing regions of the devices.

Frye '094 has been discussed above.

It would have been obvious to modify Pfeifer '993 to include differing sensing films such as taught by Frye '094 so as to provide a more selective AW sensor.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeifer '944 in view of Frye '094 as applied to claims 1-7, 9, 15, 16, 18, 19, 21, and 23 and in further view of Desu.

Pfeifer '944/Frye '094 does not specifically disclose that the sensing components comprise electrode materials chosen from among the group comprising at least one of TiN, CoSi2, and WC.

Desu has been discussed above.

It would have been obvious to modify Pfeifer '944/Frye '094 to include TiN as the electrode material such as taught by Desu in order to provide a known electrode material, in the form of a conductive nitride, on the surface of a substrate for use in a surface acoustic wave device.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeifer '993 in view of Frye '094 as applied to claims 1-7, 9, 15, 16, 18, 19, 21, and 23 and in further view of Desu.

Pfeifer '993/Frye '094 does not specifically disclose that the sensing components comprise electrode materials chosen from among the group comprising at least one of TiN, CoSi2, and WC.

Desu has been discussed above.

It would have been obvious to modify Pfeifer '993/Frye '094 to include TiN as the electrode material such as taught by Desu in order to provide a known electrode material, in the form of a conductive nitride, on the surface of a substrate for use in a surface acoustic wave device.

Claims 14 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeifer '944 in view of Frye '094 as applied to claims 1-7, 9, 15, 16, 18, 19, 21, and 23 and in further view of Ueda.

Pfeifer '944/Frye '094 does not specifically disclose that the sensing components comprise electrode materials chosen from among NiCr and CuAl.

Ueda has been discussed above

It would have been obvious to modify Pfiefer '944/Frye '094 to include an AlCu alloy material for the interdigital electrode such as taught by Ueda in order to provide Pfiefer '944/Frye '094 with a known electrode material for a SAW device (for both surface and leaky surface acoustic waves).

Claims 14 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeifer '993 in view of Frye '094 as applied to claims 1-7, 9, 15, 16, 18, 19, 21, and 23 and in further view of Ueda.

Pfeifer '993/Frye '094 does not specifically disclose that the sensing components comprise electrode materials chosen from among NiCr and CuAl.

Ueda has been discussed above

It would have been obvious to modify Pfiefer '993/Frye '094 to include an AlCu alloy material for the interdigital electrode such as taught by Ueda in order to provide Pfiefer '993/Frye '094 with a known electrode material for a SAW device (for both surface and leaky surface acoustic waves).

Response to Arguments

Applicant's arguments filed June 20th, 2008 have been fully considered but they are not persuasive.

With regards to claims 2 and 16 rejected under 35 USC 112, 2nd paragraph, Applicant argues that the currently amended recitation addresses the rejection. As discussed above, Examiner argues that the currently amended recitation presents new issues of clarity in claims 2 and 16.

With regards to claims 1-7, 9, 15, 16, 19, 21, and 23 rejected under 35 USC 103(a) over Martin in view of Frye and in view of Neuberger, Applicant traverses the rejection. Applicant argues that the combination does not teach or suggest the amended recitation of, "...wherein at least one mode frequency output of the multiple

mode frequency outputs is utilized for desorption of at least one of a plurality of analytes in the chemical species from each sensing component." Examiner argues that such a recitation is drawn to an intended use and process limitation. Whereas a device may be claimed both structurally and functionally, the claim limitations must differ over the prior art in terms of structure within a device claim. Such an intended use/process limitation is not afforded patentable weight as the claims are drawn to a device, and as the combination of prior art discloses all the claimed structural elements, the combination is said to be capable of being utilized in such a manner. Further, in paragraph [0043] of Applicant's pre-grant publication (US 2005/0226773), Applicant discloses that such desorption may arise from modes such as FPM, SH-APM, TSM, as well as many other types of modes which can be utilized in such a fashion; as Martin discloses several acoustic plate modes, including SH-APM, the device is thereby seen as capable of being utilized in such a fashion.

Applicant further argues that the recitation, "...wherein said plurality of sensing components is disposed within a cavity formed from a plurality of walls of said acoustic wave sensor" is not disclosed by Martin, Frye, or Neuberger. Examiner argues that Martin discloses and shows such a limitation as the sensing components are formed within a cavity (open space within the substrate) that is formed from the plurality of walls of the substrate 12 in the sensor 1; see figures 1, 3, and 4, for example.

Applicant further argues that Examiner has not provided explicit rationale as to why it would have been obvious to combine Martin in view of Frye and Neuberger. Examiner asserts that, as discussed above, the rationale has been provided. It would

have been obvious to modify Martin to include differing sensing films such as taught by Frye '094 so as to provide a more selective AW sensor, thereby providing a more accurate and discerning sensor. It would have been obvious to modify the modified Martin device to use quartz crystal as sensing devices (to which the thin film coating would be applied as taught by Frye) such as taught by Neuburger, as quartz crystal is a known alternative sensing component that can be effectively used in producing oscillation frequencies that may be measured and monitored by a frequency counter for gas-phase detection applications.

With regard to claim 13 rejected under 35 USC 103(a) over Martin in view of Frye and Neuberger as applied to claims 1-7, 9, 15, 16, 19, 21, and 23 and in further view of Desu, Applicant traverses the rejection.

Applicant applies the same arguments as those presented above with respect to claims 1-7, 9, 15, 16, 19, 21, and 23 being rejected over Martin in view of Frye and Neuberger. As discussed above, no such deficiencies exist in the combination of Martin in view of Frye and Neuberger.

Applicant further argues that the examiner has not provided an explicit rationale as to why it would have been obvious to combine Martin in view of Frye and Neuberger and in further view of Desu. Examiner argues that as discussed above, such rationale has been provided.

It would have been obvious to modify the modified device of Martin/Frye/Neuberger to include TiN as the electrode material such as taught by Desu

in order to provide a known electrode material, in the form of a conductive nitride, on the surface of a substrate for use in a surface acoustic wave device. This is an obvious modification as the known electrode material for use in a SAW device would have an expectation of success in the device as such a material is known to be used in surface acoustic wave devices, and thereby would be an obvious choice for a material of construction of the electrode.

With regards to claims 14 and 22 rejected under 35 USC 103(a) over Martin in view of Frye and Neuberger as applied to claims 1-7, 9, 15, 16, 19, 21, and 23 and in further view of Ueda, Applicant traverses the rejection.

Applicant applies the same arguments as those presented above for claims 1-7, 9, 15, 16, 19, 21, and 23 being rejected over Martin in view of Frye and Neuberger. As discussed above, no such deficiencies exist in the combination of Martin in view of Frye and Neuberger.

Applicant further argues that the Examiner has not provided an explicit rationale as to why it would have been obvious to combine Martin in view of Frye and Neuberger and in further view of Ueda. Examiner argues that, as discussed above, such a rationale has been provided. It would have been obvious to modify Martin/Frye'094/Neuberger to include an AlCu alloy material for the interdigital electrode such as taught by Ueda in order to provide a known electrode material for a SAW device (for both surface and leaky surface acoustic waves). This is an obvious modification as the known electrode alloy material would have an expectation of

success as an electrode material in a SAW device, and thereby would be an obvious choice for a material of construction of the interdigital electrode.

With regard to claim 18 rejected under 35 USC 103(a) over Martin in view of Frye and Neuberger as applied to claims 1-7, 9, 15, 16, 19, 21, and 23 and in further view of Pfeifer ’993, Applicant traverses the rejection.

Applicant applies the same arguments as those presented above with respect to claims 1-7, 9, 15, 16, 19, 21, and 23 rejected over Martin in view of Frye and Neuberger. As discussed above, no such deficiencies exist in Martin in view of Frye and Neuberger.

Applicant further argues that the Examiner has not provided explicit rationale as to why it would have been obvious to modify Martin in view of Frye and Neuberger in further view of Pfeifer ‘993. Examiner argues that, as discussed above, such a rationale has been provided.

It would have been obvious to modify Martin/Frye ‘094/Neuberger to include lithium niobate, crystalline quartz, or lithium tantalate as a piezoelectric material such as taught by Pfeifer ‘993 in order to provide a known piezoelectric material for use in surface acoustic wave sensors. This is an obvious modification as Martin discloses the sensing components on a piezoelectric substrate 12 and Pfeifer '993 teaches the specific piezoelectric materials noted above for the substrate as useful and applicable materials of construction for making a working surface acoustic wave sensor.

With regards to claims 1-7, 9, 15, 16, 18, 19, 21, and 23 rejected under 35 USC 103(a) over Pfeifer '944 in view of Frye, Applicant traverses the rejection.

Applicant argues that Pfeifer '944 in view of Frye does not disclose at least one mode frequency output of the multiple mode frequency outputs is utilized for desorption of at least one analyte. As discussed above, such a recitation is drawn to an intended use and process limitation of the device, which is not afforded patentable weight within device claims. Further, as discussed above, as Pfeifer '944 in view of Frye discloses all the structural elements of the device, the combination of Pfeifer '944 in view of Frye is said to be capable of being utilized in such a fashion.

Applicant further argues that the Examiner has not provided an explicit rationale as to why it would have been obvious to combine Pfeifer '944 and Frye. Examiner asserts that, as discussed above, such a rationale has been provided. It would have been obvious to modify Pfeifer '944 to include differing sensing films such as taught by Frye '094 so as to provide a more selective AW sensor, thereby providing a more accurate and discerning sensor.

With regard to claims 13 rejected under 35 USC 103(a) over Pfeifer '944 in view of Frye as applied to claims 1-7, 9, 15, 16, 21, and 23 and in further view of Desu, Applicant traverses the rejection.

Applicant applies the same argument as that presented above with respect to claims 1-7, 9, 15, 16, 21, and 23 rejected over Pfeifer '944 in view of Frye. As

discussed above, Pfeifer ‘944 in view of Frye does not have such a deficiency, as the combination of Pfeifer ‘944 in view of Frye is capable of being utilized in such a fashion.

Applicant further argues that the Examiner has not provided an explicit rationale as to why it would have been obvious to combine Pfeifer ‘944 in view of Frye and in further view of Desu. Examiner asserts that, as discussed above, such a rationale has been provided. It would have been obvious to modify Pfeifer ‘944/Frye ‘094 to include TiN as the electrode material such as taught by Desu in order to provide a known electrode material, in the form of a conductive nitride, on the surface of a substrate for use in a surface acoustic wave device. This is an obvious modification as the known electrode material for use in a SAW device would have an expectation of success in the device as such a material is known to be used in surface acoustic wave devices, and thereby would be an obvious choice for a material of construction of the electrode.

With regards to claims 14 and 22 being rejected under 35 USC 103(a) over Pfeifer ‘944 in view of Frye as applied to claims 1-7, 9, 15, 16, 18, 21, and 23 and in further view of Ueda, Applicant traverses the rejection.

Applicant applies the same arguments as those presented with respect to the rejection of claims 1-7, 9, 15, 16, 19, 21, and 23 over Pfeifer ‘944 in view of Frye. As discussed above, no such deficiency exists in the combination of Pfeifer ‘944 in view of Frye.

Applicant further argues that the Examiner has not provide explicit rationale as to why it would have been obvious to combine Pfeifer '944 in view of Frye and in further

view of Ueda. Examiner asserts that, as discussed above, such rationale has been provided. It would have been obvious to modify Pfeifer '944/Frye to include an AlCu alloy material for the interdigital electrode such as taught by Ueda in order to provide a known electrode material for a SAW device (for both surface and leaky surface acoustic waves). This is an obvious modification as the known electrode alloy material would have an expectation of success as an electrode material in a SAW device, and thereby would be an obvious choice for a material of construction of the interdigital electrode.

With regards to claims 1-7, 9, 15, 16, 18, 19, 21, and 23 rejected under 35 USC 103(a) over Pfeifer '993 in view of Frye, Applicant traverses the rejection.

Applicant applies the same arguments as those presented with respect to claims 1-7, 9, 15, 16, 19, 21, and 23 over Martin in view of Frye and Neuberger. As discussed above, no such deficiency lies within the combination of Martin in view of Frye and Neuberger, and likewise, no such deficiency exists in the combination of Pfeifer '993 in view of Frye. As discussed above, such a recitation is drawn to an intended use and process limitation of the device, which is not afforded patentable weight within device claims. Further, as discussed above, as Pfeifer '993 in view of Frye discloses all the structural elements of the device, the combination of Pfeifer '993 in view of Frye is said to be capable of being utilized in such a fashion.

Applicant further argues that the Examiner has not provided an explicit rationale as to why it would have been obvious to combine Pfeifer '993 in view of Frye. Examiner asserts that, as discussed above, such rationale has been provided. It would have

been obvious to modify Pfeifer '993 to include differing sensing films such as taught by Frye '094 so as to provide a more selective AW sensor, thereby providing a more accurate and discerning sensor.

With regard to claims 13 rejected under 35 USC 103(a) over Pfeifer '993 in view of Frye as applied to claims 1-7, 9, 15, 16, 18, 19, 21, and 23 and in further view of Desu, Applicant traverses the rejection.

Applicant applies the same argument as that presented above with respect to claims 1-7, 9, 15, 16, 21, and 23 rejected over Pfeifer '993 in view of Frye. As discussed above Pfeifer '993 in view of Frye also does not have such a deficiency of, as the combination of Pfeifer '993 in view of Frye is capable of being utilized in such a fashion.

Applicant further argues that the Examiner has not provided an explicit rationale as to why it would have been obvious to combine Pfeifer '993 in view of Frye and in further view of Desu. Examiner asserts that, as discussed above, such a rationale has been provided. It would have been obvious to modify Pfeifer '993/Frye '094 to include TiN as the electrode material such as taught by Desu in order to provide a known electrode material, in the form of a conductive nitride, on the surface of a substrate for use in a surface acoustic wave device. This is an obvious modification as the known electrode material for use in a SAW device would have an expectation of success in the device as such a material is known to be used in surface acoustic wave devices, and thereby would be an obvious choice for a material of construction of the electrode.

With regards to claims 14 and 22 being rejected under 35 USC 103(a) over Pfeifer ‘993 in view of Frye as applied to claims 1-7, 9, 15, 16, 18, 19, 21, and 23 and in further view of Ueda, Applicant traverses the rejection.

Applicant applies the same arguments as those presented with respect to the rejection of claims 1-7, 9, 15, 16, 19, 21, and 23 over Pfeifer ‘993 in view of Frye. As discussed above, no such deficiency exists in the combination of Pfeifer ‘993 in view of Frye.

Applicant further argues that the Examiner has not provide explicit rationale as to why it would have been obvious to combine Pfeifer '993 in view of Frye and in further view of Ueda. Examiner asserts that, as discussed above, such rationale has been provided. It would have been obvious to modify Pfeifer ‘993/Frye to include an AlCu alloy material for the interdigital electrode such as taught by Ueda in order to provide a known electrode material for a SAW device (for both surface and leaky surface acoustic waves). This is an obvious modification as the known electrode alloy material would have an expectation of success as an electrode material in a SAW device, and thereby would be an obvious choice for a material of construction of the interdigital electrode.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NEIL TURK whose telephone number is (571)272-8914. The examiner can normally be reached on M-F, 9-630.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on 571-272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NT

/Jill Warden/
Supervisory Patent Examiner, Art Unit 1797